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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/598,515

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EXAMINER

PAK, HANNAH J

ART UNIT

PAPER NUMBER

4171

MAIL DATE

DELIVERY MODE

08/13/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/598,515	Applicant(s) AKAGI ET AL.	
	Examiner Hannah Pak	Art Unit 4171	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>07/18/08 and 12/22/06</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

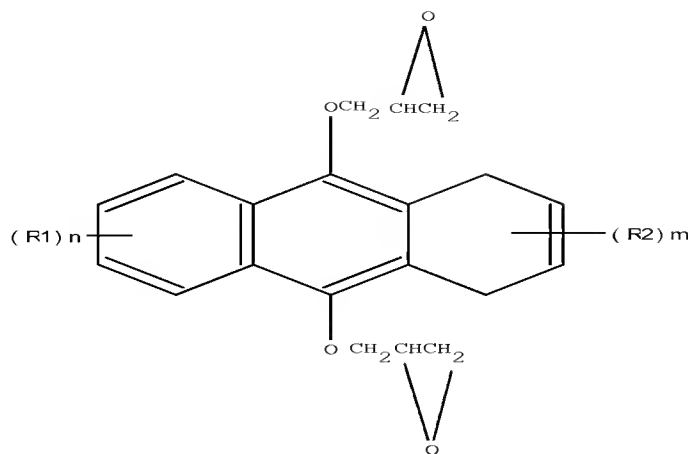
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

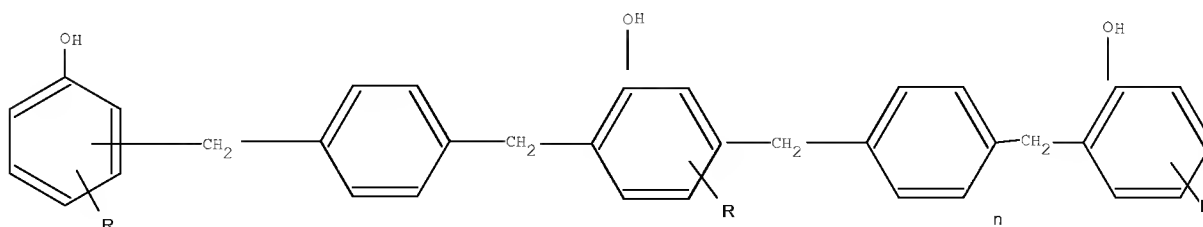
Claims 1-12, 18-20, 22-24, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikezawa et al. (US 2003/0201548) in view of Nakamura et al. (JP 05-283560).

The applicants claim a sealant epoxy-resin molding material, comprising an epoxy resin and a hardening agent, wherein the epoxy resin contains a compound represented by the following formula below:



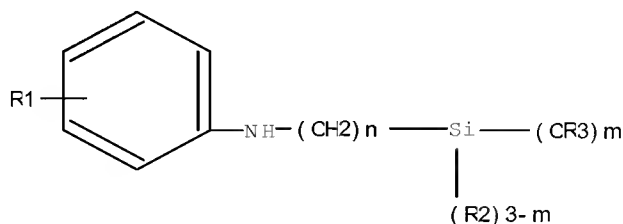
As shown above, R^1 represents a group selected from substituted or unsubstituted hydrocarbon groups having 1-12 carbon atoms and substituted or unsubstituted alkoxy groups having 1-12 carbon atoms, and the groups R^1 may be the same as or different from each other; n is an integer of 0-4; R^2 represents a group selected from substituted or unsubstituted hydrocarbon groups having 1-12 carbon atoms and the groups R^2 may be the same as or different from each other; and m is an integer of 0-6.

With respect to claims 1-5, 6-11, 20 and 22-23, Ikezawa et al. disclose an encapsulating epoxy resin molding material suitable for a thin semiconductor device comprising an epoxy resin, a curing (or hardening) agent, and a silane coupling agent having a secondary amino group, (Paragraphs 1 and 12). The curing (or hardening) agent contains a compound represented by the formula:



Art Unit: 4171

wherein R is selected from a hydrogen atom and a C₁₋₁₀ substituted or unsubstituted monovalent hydrocarbon group, and n is an integer of 0-10 (Paragraphs 34-35). This corresponds to the formula II recited in claim 2. The secondary amino group-containing silane-coupling agent also contains a compound having the formula:



Wherein R¹ is selected from a hydrogen atom, a C₁₋₆ alkyl group and a C₁₋₂ alkoxy group, R² is selected from a C₁₋₆ alkyl group and a phenyl group, R³ represents a methyl or ethyl group, n is an integer of 1-5, and m is an integer of 1-3 (Paragraphs 39-40).

This formula corresponds to the formula 3 recited in claim 11. Moreover, the encapsulating epoxy resin molding material further comprises preferably 75% by weight of inorganic filler, a curing (hardening) accelerator and another coupling agent (Paragraphs 21-22 and 103-105). Ikezawa et al. also disclose examples of curing(hardening) promoter or accelerator, including triphenylphosphine tetraphenyl borate, and an adduct of organic phosphine and quinone compound (Paragraph 110).

Regarding claims 12 and 24, Ikezawa et al. suggest previously melt-mixing the epoxy resin and curing (hardening) agent (Paragraphs 25 and 33).

As to claims 18-19 and 26, Ikezawa et al. disclose employing a compound in the encapsulating epoxy resin molding material having the formula:

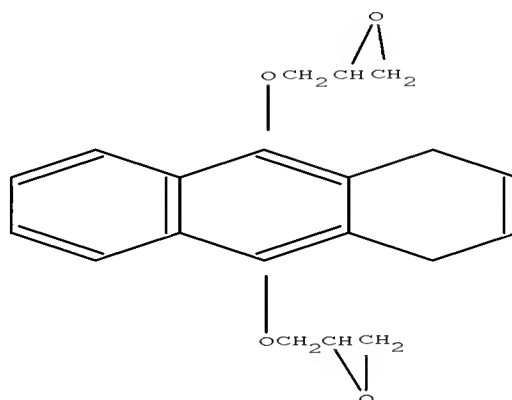
Art Unit: 4171

$\text{Mg}_{1-x}\text{Al}_x(\text{OH})_2(\text{CO}_3)_{x/2} \cdot m\text{H}_2\text{O}$, wherein $0 < x \leq 0.5$ and m is an integer (Paragraph 30).

Ikezawa et al. also teach a semiconductor device comprising an active element with encapsulating epoxy resin molding material (Paragraph 135).

Although Ikezawa et al. do mention examples of epoxy resin used in the encapsulating epoxy resin molding materials (compare paragraph 70 with page 14 of the specification), they do not specifically mention the formula, which represents the compound contained in the epoxy resin recited in claim 1.

Nakamura et al. disclose a semiconductor device using the epoxy compound having the following formula below (Paragraph 43, Formula 9):



This formula corresponds to formula 1 in claim 1, when $n = 0$, R^1 or R^2 groups would not be necessary. Nakamura et al. further disclose this epoxy resin with sealing (or encapsulating) material is excellent in reliability, including humidity-tolerant reliability and reliability over heat-resistant (Paragraphs 1-2). The semiconductor device would also have improved crack resistant characteristic (Paragraph 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the compound having the specified formula taught by

Nakamura et al. in the encapsulating epoxy resin molding material of Ikezawa et al. to obtain excellent properties or characteristics.

Claims 13-17, 21, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikezawa et al. (US 2003/0201548) in view of Nakamura et al. (JP 05-283560) as applied to claims 1-12, 18-20, 22-24, and 26 above, and further in view of Isshiki et al. (US 6,040, 395) and applicant's submission.

The disclosures of Ikezawa et al. and Nakamura et al. are discussed above. Although Nakamura et al. mention employing silicone compound in its encapsulating epoxy-resin molding material (Paragraphs 27-41), they do not mention the specific formula of the silicon-containing compound polymer and its specific properties.

However, Isshiki et al. teach epoxy-functional organoalkoxysilane, for example, 3-glycidoxypropyltrimethoxysilane, with the general formula $R^1Si(OR^4)_3$, wherein R^1 represents epoxy functional monovalent organic group, and R^4 represents alkyl groups of 1-4 carbon atoms, including methyl, ethyl, propyl and butyl, in curable epoxy resins with sealants of electrical components (compare Col. 3, lines 34-53 with page 34 of the specification, Col. 1, lines 45-51, and Col. 4, lines 22-27). The silicon bonded organic groups can also include hydroxyl group, aryl groups, such as phenyl, and alkenyl groups, such as vinyl (Col. 3, lines 7-24). This formula corresponds to the formulae recited in claims 13-14, 21, and 25. Isshiki et al. further suggest this silicone can protect the electrical elements, including semiconductor chips and resistors, from internal

Art Unit: 4171

stresses originating from the expansion and shrinkage of the cured resin sealant (Col. 1, lines 18-25).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the silicon-containing compound polymer having the specific formula taught by Isshiki et al. in the encapsulating epoxy-resin molding material of Ikezawa et al. to protect its electrical elements from internal stresses.

Moreover, the applicant acknowledges the silicon-containing polymers (F) are commercially sold under the trade name Ay42-119, manufactured by Dow Corning Toray Silicone Co., LTD (Page 33 of the specification). Thus, it would have been obvious to use silicon-containing polymers (F) in the encapsulating epoxy resin molding material taught by Ikezawa et al. since the product is commercially sold and available to the public.

As to specific properties, epoxy equivalence and softening temperature, of the silicon containing polymers recited in claims 13-15, 17, 21 and 25, Isshiki et al. teach the same encapsulating (or sealant) epoxy resin molding material of electrical components made of the same epoxy resin, curing agents, and curing accelerator (Col. 4, lines 22-25 and Col. 6, lines 35-40). Therefore, one of ordinary skill in the art would have reasonably expected that the silicon-containing polymers taught or suggested by Isshiki et al. would necessarily have the properties of the claimed epoxy resin molding material, including the same epoxy equivalence and softening temperature (*see MPEP § 2112.01*).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hannah Pak whose telephone number is (571)270-5456. The examiner can normally be reached on Monday - alternating Fridays (7:30 am - 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on 571-272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/
Supervisory Patent Examiner, Art Unit 4171

Hannah Pak
Examiner
Art Unit 4171

/HP/